Job Risk Analysis

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Job Title: MCR Watches, CAS Watch, Tandem Watch, Cryogenics Watch, Siemens Watch Job Number or Job Identifier: JRA 13a-05	Frequency (B)	≤once/year	≤once/month	≤once/week	≤once/shift	>once/shift
Job Description: Routine and non-routine tours, inspection, alarm responses, of C-AD facility on a 24 hour shift rotation.	Severity (C)	First Aid Only	Medical Treatment	Lost Time	Partial Disability	Death or Permanent Disability
Training and Procedures List (optional): C-A Access, RW-1, RW-300, Electrical (safety, LOTO, working hot), Confined Spaces, Hazard Communication, OJT equipment training, C-AD OPM	Likelihood (D)	Extremely Unlikely	Unlikely	Possible	Probable	Multiple
Approved by: *E. Lessard* Date: 4-7-05 Rev. #: 0						

Stressors (if applicable, please list all):	Reason for Revision (if applicable):	Comments:
Heat, poor lighting, moisture, snow, extended work hours, working alone		

				Before Additional Controls						After Additional Controls					
Job Step / Task	Hazard	Control(s)	**Stressors Y/N**	**# of People A**	**Frequency B**	**Severity C**	**Likelihood D**	**Risk* AxBxCxD**	Control(s) Added to Reduce Risk	**Stressors Y/N**	**# of People A**	**Frequency B**	**Severity C**	**Likelihood D**	**Risk* AxBxCxD**	% Risk Reduction
Sweeps in buildings	Ionizing radiation exposure	RWP, training, surveys, PPE, TLD, EPD, entry log sheets, procedures, postings, access control systems, chipmunks, RCT support	Y	2	3	1	2	12								
Sweeps in buildings	Electrical	LOTO, work planning, training, procedures, postings, guarding	Y	2	4	3	2	48	See Notes 1 through 4	Y	2	4	3	1	24	50%
Sweeps in buildings	Being struck by an object due to improperly secured material or loss of control of objects in magnetic fields	LOTO, training, procedures, postings, magnetic field measurements	Y	2	3	1	2	12								
Sweeps in buildings	Being struck by an object due to a pressure release in nearby pressurized systems	LOTO, work planning, procedures, postings, caution tags	Y	2	3	2	2	24								
Sweeps in buildings	Being struck against an object due to protrusions in the aisle way	PPE	Y	2	3	2	3	36	Operators who perform sweeps in the AGS Ring have been requested to wear bicycle helmets since they offer head protection	Y	2	3	2	2	24	33%

Sweeps in buildings	Oxygen deficiency	Training, PPE, POMs, postings, PASS oxygen alarms, installed oxygen alarms, LOTO, work planning, procedures, evacuation training	Y	2	3	3	2	36									
Sweeps in buildings	Noise	Training, procedures, PPE, postings	Y	2	3	2	2	24									
Sweeps in buildings	Falls on same level due to poor walking surfaces	Maintenance of walking surfaces, lighting, proper shoes, work planning, procedures	Y	2	3	3	3	54	The sweep in the AGS Ring has been modified to avoid walking on cable trays.	Y	2	3	3	2	36	33%
Sweeps in buildings	Falls to lower level such as falling from a ladder or over a railing	Training, railings, proper ladders, maintenance of surfaces, stairs, alternate methods of conducting sweeps, proper shoes	Y	2	3	3	3	54									
Sweeps outside	Ionizing radiation exposure	RWP, training, surveys, PPE, TLD, entry log sheets, procedures, postings, access control systems, chipmunks, RCT support, lighting	Y	2	3	1	2	12									
Sweeps outside	Electrical	LOTO, work planning, training, procedures, postings, guarding	Y	2	3	3	2	36	See Notes 1 through 4	Y	2	3	3	1	18	50%
Sweeps outside	Falls on same level due to poor walking surfaces	Maintenance of walking surfaces, lighting, proper shoes, work planning, procedures, snow shoveling, stay off steep slopes	Y	2	3	3	3	54									
Sweeps outside	Falls to lower level such as falling from a ladder or over a railing or rolling down a shield berm	Training, railings, proper ladders, maintenance of surfaces, stairs, alternate methods of conducting sweeps, proper shoes	Y	2	3	4	3	72	Railings have been added to certain areas such as concrete soil caps. Additional areas need to be corrected and some of this work is scheduled.	Y	2	3	4	2	48	33%
Sweeps outside	Ticks, spiders, bees wasps, etc.	Training, procedures, PPE, bug sprays, post sweep body checks	Y	2	3	3	3	54									
Sweeps outside	Bushes, trees, etc.	Maintenance of area, awareness of hazards, PPE	Y	2	3	2	3	36									
Gate Watch	Ionizing radiation exposure	RWP, procedures, TLD	Y	1	2	1	2	4									
Facility tours	Ionizing radiation exposure	RWP, training, surveys, PPE, TLD, EPD, entry log sheets, procedures, postings, access control systems, chipmunks	Y	1	5	1	2	10									
Facility tours	Electrical	LOTO, PPE, work planning, training, procedures, postings, guarding, barriers, warning lights	Y	1	5	3	3	45	See Notes 1 through 4	Y	1	5	3	2	30	33%
Facility tours	Being struck by an object due to improperly secured material or loss of control of objects in magnetic fields	LOTO, training, procedures, postings, magnetic field measurements	Y	1	5	3	3	45									
Facility tours	Being struck by an object due to a pressure release in nearby pressurized systems	LOTO, work planning, procedures, postings, caution tags	Y	1	5	3	3	45									

Facility tours	Oxygen deficiency	Training, PPE, POMs, postings, PASS oxygen alarms, installed oxygen alarms, LOTO, work planning, procedures, evacuation training	Y	1	5	3	2	25									
Facility tours	Noise	Training, procedures, PPE, postings, minimizing time spent in noise areas	Y	1	5	4	2	40									
Facility tours	Falls on same level due to poor or uneven walking surfaces	Maintenance of walking surfaces, lighting, safety shoes, work planning, snow removal, yellow and black tape on trip hazards	Y	1	5	3	3	45	Emphasis has been placed on snow removal in walkways. Priority areas have been posted with signs and snow removal crews work on these areas first in order to make facility tours safer. Snow shovels have been assigned locally.	Y	1	5	3	2	25	44%
Facility tours	Falls to lower level such as falling from a ladder or over a railing or rolling down a shield berm	Training, railings, proper ladders, maintenance of surfaces, stairs, safety shoes	Y	1	5	3	2	30									
Facility tours	Flammable and combustible gases	Training, procedures, postings, work planning, gas concentration alarms	Y	1	5	2	2	20									
Facility tours	Biological hazards	Training, ventilation, PPE, cleanliness controls, ESRC reviews, normal and emergency procedures	Y	1	5	2	2	20									
Facility tours	Working alone	Cell phones, pagers, radios, cameras and communications with Control Room or Site Supervisor, calling-in for assistance to perform tasks	Y	1	5	3	3	45									
Facility tours	Being struck against an object such as walking into a door frame or an obstruction in the walkway	OSHA compliance with regard to walkway obstructions, yellow and black warning tape on trip hazards or walkway obstructions, proper lighting, protective covers on obstructions in walkways	Y	1	5	3	3	45	See “Further Description of Controls Added to Reduce Risk” below								
Provide safety watch	Ionizing radiation exposure	RWP, training, surveys, PPE, TLD, EPD, entry log sheets, procedures, postings, access control systems, chipmunks, RCT support, 2-man oversight	Y	2	3	1	2	12									
Provide safety watch	Electrical	LOTO, work planning, training, procedures, postings, guarding, PPE, working hot permits, safe distance requirements, Fire/rescue group, emergency response, 2-man oversight	Y	2	4	3	2	48	See Notes 1 through 4	Y	2	4	3	1	24	50%
Provide safety watch	Being struck by an object due to improperly secured material or loss of control of objects in magnetic fields	LOTO, training, procedures, postings, magnetic field measurements, 2-man oversight	Y	2	2	3	2	24									
Provide safety watch	Being struck by an object due to a pressure release in nearby pressurized systems	LOTO, work planning, procedures, postings, caution tags, Fire/rescue group, emergency response, 2-man oversight	Y	2	3	3	2	36									

Provide safety watch	Oxygen deficiency	Training, PPE, POMs, postings, PASS oxygen alarms, installed oxygen alarms, LOTO, work planning, procedures, evacuation training, 2-man oversight	Y	2	3	3	2	36									
Provide safety watch	Noise	Training, procedures, PPE, postings, 2-man oversight	Y	2	3	4	2	48									
Provide safety watch	Falls to lower level such as falling from a ladder or over a railing or rolling down a shield berm	Training, railings, proper ladders, maintenance of surfaces, stairs, proper shoes, Fire/rescue group, emergency response, 2-man oversight	Y	2	3	3	2	36									
Provide safety watch	Flammable and combustible gases	Training, procedures, MSDS, postings, work planning, gas concentration alarms, Fire/rescue group, emergency response, fire alarms, 2-man oversight	Y	2	2	2	2	16									
Emergency response	See JRA 14-05																
Incidental snow shoveling	Overexertion – injuries caused by excessive lifting, pushing, pulling, holding, carrying or throwing of an object	Proper shoes, gloves, minimize amount of shoveling, PE grounds shoveling, procedures	Y	1	2	3	3	18									
Vehicle use	Vehicle accidents	Licensed drivers, traffic rules and postings, seat belts, vehicle inspections and maintenance	Y	1	5	4	3	60	BNL has instituted a program to enforce traffic rules and to have these violations count as safety infractions, which impacts an individual's performance appraisal	Y	1	5	4	2	40	33%
Incidental rigging	See JRA 19-05 and JRA 20-05																
Transportation of small equipment in lab vehicles	See JRA 1-05																
Incidental cleanup	Overexertion – injuries caused by excessive lifting, pushing, pulling, holding, carrying or throwing of an object	Work planning, back safety training as appropriate, dolleys, hand trucks	Y	2	3	2	3	36									
Incidental cleanup	Falls on same level	Work planning, proper shoes, snow removal, work surface maintenance, roof maintenance, postings	Y	2	3	3	2	36									
Incidental cleanup	Bodily reaction – injuries resulting from bending, climbing, loss of balance and slipping without falling	Work planning, back safety training as appropriate, dollies, hand trucks, snow removal	Y	2	3	2	3	36									

Incidental cleanup	Falls to lower level, such as falling from a ladder or over a railing	Postings, railings, work planning, ladder training	Y	2	3	3	3	54									
Incidental cleanup	Being struck by an object, such as a tool falling on a worker from above	PPE, work planning, postings	Y	2	3	3	2	36									
Incidental cleanup	Being struck against an object, such as a carpenter walking into a door frame	PPE, work planning	Y	2	3	2	2	24									
Incidental cleanup	Becoming caught in or compressed by equipment	Guarding, work planning, postings	Y	2	3	4	2	48									
Incidental cleanup	Contact with temperature – extremes that result in such injuries as heat exhaustion, frost bite or burns	Guarding, postings, work planning	Y	2	3	3	2	36									
Working on Electrical Equipment & Power Supplies BNL Class A & B <250 VAC; <1000Vdc	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working hot permits; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures, NFPA 70E PPE	Y	2	3	4	2	48	See Notes 1 through 4	Y	2	3	3	1	18	63%
Working with Electrical Equipment & Power Supplies BNL Class C <600 VAC; <6000 VDC	Arc blast; burn	Procedures, training, NFPA 70E PPE	Y	2	2	5	2	40	See Notes 1 through 4	Y	2	2	3	1	12	70%
Operating Electrical Disconnects And Switches	Arc blast; burn	Procedures, training, NFPA 70E PPE	Y	1	3	4	3	36	See Notes 1 through 4	Y	1	3	3	1	9	75%
Operating Electrical Disconnects And Switches	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working hot permits; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures; two-person rule for hot work, NFPA 70E PPE	Y	1	3	4	3	36	See Notes 1 through 4	Y	1	3	3	1	9	75%

Operating Motor Control Centers; Panels And Wall Sockets	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards	Y	1	3	4	3	36	See Notes 1 through 4	Y	1	3	3	1	9	75%
Operating Motor Control Centers; Panels And Wall Sockets	Arc blast; burn	NFPA 70E PPE; training; procedures	Y	1	3	4	3	36	See Notes 1 through 4	Y	1	3	3	1	9	75%
Using Electrical Powered Hand Tools	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; procedures; training; labeling; work planning; GFCI; grounding standards; double insulation	Y	2	3	3	2	36									
Using Extension Chords; Temporary Wiring And Power Strips	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; qualified electricians and technicians; GFCI; grounding standards	Y	2	3	3	2	36									
Chemical Handling	Eye exposure	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	Y	2	2	2	3	24									
Chemical Handling	Inhalation exposure	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	Y	2	2	2	3	24									
Chemicals Handling	Fire; explosions	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	Y	2	2	2	3	24									
Chemical Handling	Burns	Procedures, compliance with regulations, training, CMS inventory, MSDS, volume controls, Fire/Rescue group response, PPE as required, locked or controlled areas, postings, labeling, proper containers, segregation, spill cleanup equipment available, Tier 1 inspections	Y	2	2	2	3	24									

Working near vacuum equipment	Being struck against an object due to a pressure differential near a broken vacuum window	Training, posting, guarding, PPE as needed	Y	2	2	4	3	48									
Changing PCB capacitors	Chemical exposure	PPE, postings, PCB capacitor inventory, Fire/rescue spill response, secondary containment, procedures	Y	1	2	2	2	8									
Working with pressurized water and gas systems	Being struck by an object due to a pressure release	LOTO, procedures	Y	2	3	3	2	36									
Working with pressurized water and gas systems	Becoming caught in or compressed by equipment or rotating machinery	LOTO, work planning, procedures, guarding	Y	2	2	4	2	32									
Office work, computer usage	Repetitive motion	Ergonomic work station reviews, frequent breaks during repetitive motion work	Y	1	5	2	3	30									
Manual Material Handling	See JRA 3-05																
Entering confined Spaces	See JRA 23-05																
Working with and operating cryogenic systems	Contact with temperature – extremes that result in such injuries as frost bite or burns	Guarding, postings, work planning, procedures	Y	1	5	2	3	30									
Conducting pressure testing with gas	Being struck by an object due to a pressure release	LOTO, relief valve testing, procedures, training, work planning	Y	2	2	3	2	24									
Fork truck use	See JRA 20-05																
Source replacement work at Linac and Tandem	Ionizing radiation exposure	Training, experts prepare sources, MSDS, CMS, procedures, RWP, RCT support if required, two people for work, fume hoods, emergency response, PPE, work planning.	Y	2	2	1	2	8									
Source replacement work at Linac and Tandem - electrical, mechanical	Becoming caught in or compressed by equipment	Procedures, LOTO, disconnects, proper grounding procedures and equipment, two man rule, expert help	Y	2	2	4	3	48									

Further Description of Controls Added to Reduce Risk:

1) The following issues are assigned to P. Cirnigliaro (ESHQ Division) for follow-up:

- the walkway along the turbines in the compressor building (1005) needs to be widened, and protective covers need to be installed over turbine brakes that extend into the walkway
- external lighting needs to be fixed on the refrigerator building (1005)
- a cross-bar in the walkway near an exit in the refrigerator building (1005) needs yellow and black warning tape
- workers in CAS Group need to wear safety shoes at all times during working hours since they are on-call to respond anywhere in the complex
- a step needs to be installed in the valve box pits at 1005 (8 and 2 o'clock buildings) and lighting needs to be fixed in the 4 o'clock building
- consult on possible upgrade of POMs for the CAS Group

Notes 1-4:
NOTE 1: OSHA Teams visited C-AD during the period October 20 through October 31, 2003 and recorded electrical non-compliances. All OSHA findings will be closed by 2006 by full compliance or with an equivalent level of safety. The status of the OSHA items are maintained in BNL's Compliance suite, and closed on a schedule commensurate with funding.

NOTE 2: A compliance plan to have all electrical installations accepted by an Authority Having Jurisdiction (AHJ), as per 29CFR1910 Subpart S, has been implemented by BNL. UL, CSA, LLC or other NRTL accepted equipment will be acquired at BNL for all future installations. Prior installations shall be reviewed and accepted by qualified AHJs. The plan must be completed by 2009.

NOTE 3: Full compliance with NFPA 70E was adopted by the C-AD in December 2005. NFPA 70E prescribes protective clothing to protect against shock and arc blast; thus reducing the severity and likelihood of an injury. It also prescribes training, which is currently fulfilled by taking the 2005 version of Electrical Safety 1 and by attending the C-AD 3-hour classroom course on electrical safety rules and PPE.

NOTE 4: Contractor and vendor training in work planning and electrical safety has been improved. Plans to reach all contractors and vendors with regard to NFPA 70E requirements prior to performing work at BNL have been implemented. C-AD has obtained lists of all its vendors and suppliers and is ensuring that they take Electrical Safety 1 or have equivalent training if needed.

*Risk:	0 to 20	21 to 40	41-60	61 to 80	81 or greater
	Negligible	Acceptable	Moderate	Substantial	Intolerable